UCDAVIS HEALTH | SCHOOL OF MEDICINE

Medical Microbiology & Immunology
MMI 291 Seminar Series
Emerging Challenges in Microbiology and Immunology

MMI 291 Seminar Series

Current Theme: Interdisciplinary Research
Spring Quarter 2021 – CRN 51367

Friday Seminar – 12:10-1 p.m.

"Genomics of Antarctic Cyanobacteria: Biography, Circadian Rhythms, and Oxygenic Photosynthesis in the Presence of Hydrogen Sulfide"

May 7

Jessica Mizzi, PhD Candidate
PhD Candidate, Sumner Lab
Earth and Planetary Sciences
Microbiology Graduate Group
UC Davis

May 7, 2021
12:10 – 1 p.m.
ZOOM Meeting

Medical Microbiology & Immunology
School of Medicine

Seminar Contact:
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We hope to see you there!

Research / Bio

Cyanobacteria living in polar environments face many challenges to their survival, such as cold temperatures and months of darkness followed by months of constant light. However, microbial mats and pinnacles containing Cyanobacteria grow in the ice-covered lakes Vanda and Fryxell in the McMurdo Dry Valleys, Antarctica. The ice cover provides protection from high UV and light stress during summer months and prevents lake water from mixing, allowing biogeochemical gradients to form. Despite the interesting environmental challenges, there are only five publicly available Antarctic Cyanobacteria genomes on NCBI. This work presents five novel Cyanobacteria metagenome-assembled genomes (MAGs) from lakes Fryxell and Vanda. Comparative genomics has shown that the MAGs contain circadian rhythm genes consistent with Cyanobacteria living in environments with a 24 hour diel cycle. Biogeography analysis has revealed that some of these MAGs are also found in a variety of environments around the globe, while others are only found in Antarctica. One of the MAGs living only in Antarctica is Phormidium pseudopriestleyi, which performs oxygenic photosynthesis in the presence of hydrogen sulfide, despite the fact that sulfide normally inhibits this process. Analysis of these MAGs shows the diversity of Cyanobacteria responses to living in Antarctic conditions.

Publications

Lumian JE (married name), Junglut AD, Dillon ML, Hawes I, Doran PT, Mackey TJ, Dick GJ, Grettenberger CL, Sumner DY. *Metabolic Capacity of the Antarctic Cyanobacterium Phormidium pseudopriestleyi that Sustains Oxygenic Photosynthesis in the Presence of Hydrogen Sulfide.* Genes 2021, 12:426. doi: 10.3390/genes12030426

Mizzi JE, Lounsberry ZT, Brown CT, Sacks BN. *Draft Genome of tule elk Cervus elaphus nannodes*. F1000Res 2017, 6:1691 doi: 10.12688/f1000research.12636.2.

Mizzi JE and LaDuca RL. *A Molecular Layer "Fabric" with Orthogonally Woven Coordination Polymer Chains.* Inorganic Chemistry Communications 2016, 70:4-6. doi: 10.1016/j.inoche.2016.05.017